BLIND TO SEE BY SOUND

Robert D. Potter

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Condensed from The American Weekly*

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Science Editor

AFTER the war, when science can be turned to peacetime things, the blind will be able to see by sound.

If submarines can be hunted by echoing sound devices in the ocean's depths, where the blackness is as dense and as real as it is for any blind man, why cannot sound transmitters and detectors become standard equipment for the blind?

Far-sighted scientists who ask themselves such questions pause, nod their heads and say, "Yes, it can be done."

Some, like Dr. Simon Ramo, electronics engineer of the General Electric Company, have given the blueprint of the future in that day when the blind will see by sound with the aid of radio, television and acoustical skill. Here is the blind's blueprint of tomorrow.

For centuries the so-called "sixth sense" of the blind has been a challenge to the powers of science to explain it. Formerly attributed to all manner of mystical things, the blind's sixth sense is now known to consist of an acute sense of hearing plus trained powers of interpretation of the sounds that are heard.

Not long ago, Professor Karl M. Dallenbach of Cornell University's Department of Psychology, in a series of controlled experiments with blind and normal subjects, proved that the keen awareness of the blind for walls, doors and other obstructions was really due to their ability to detect sounds reflected off those surfaces.

Professor Dallenbach proved this to be true by covering the ears of his blind subjects so they could not hear their own footsteps or other sounds. Then they, too, walked into obstacles as any one else might do. When deafened with ear pads their sixth sense disappeared.

The discoveries of Professor Dallenbach, and other workers in this field, suggest to men like Dr. Ramo that the keen ability of the blind to detect the reflections of sounds from walls and other obstacles could be made much more sensitive and acute with the aids of science.

Suppose the blind person carried on his chest a tiny and unnoticeable black box smaller than a compact portable radio, and that in one ear the blind person had a small and hidden earphone of the kind that deaf people now wear.

The black box would be at once a transmitter of directional sound waves and also a receiver to detect lately, "With 10 cubic centimeters more fuel I would have been able to make that hill and coast another mile and three-quarters."

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*September 27, 1942. Further publication prohibited.

The average driver may not achieve 88 miles per gallon; but by avoiding high-speed driving, unnecessary use of brakes, and excessive acceleration, and by checking the economy points of his car, he can save himself more gasoline than he ever thought possible, and care for his car for his country in the bargain.

* * *

Things That Help You See Better

A SIGNIFICANT discovery about the human vision and other senses, which might be used to increase the war efforts of the united nations, was revealed today.

Professor Krikor Kercheev, Russian scientist, has reported in Nature, British scientific publication received from London, the following discovery made by him and his colleagues in a Soviet government laboratory in Moscow:

The keenness of the human vision, hearing and other senses can be increased or decreased by certain influences.

The stimulation of one sense influences the other senses. Thus, the power of the human eye to adapt itself to dim light is increased by certain sounds, tastes, cold or warmth and touch. Similarly the sense of hearing changes when the eye or other senses are also being stimulated.

Different tastes, sweet, bitter, salty, acid, increase or decrease the sense of sight in various degrees. The touch of a human hand increases or decreases the power of vision or hearing according to special conditions.

The investigations also showed that the condition of the stomach and other internal organs, even so simple a condition as the fullness or emptiness of the stomach, markedly affects the sensitivity of the human vision.

Strong stimulation applied to any part of the human body altered the sensitivity of the eye. What was true of vision was true of all other senses.

One drug, geraniol, quickened the pulse rate as well as increased the power of vision. Another drug, thymol, slowed down the pulse rate as well as the sensitiveness of the human eye.

Such experiments bear out a theory first advanced by Dr. L. A. Orbeli that the sense organs become more or less alert and active according to the influence of the "vegetative nervous system."

The "vegetative nervous system" consists of the nerves which automatically regulate the key processes of life, such as circulation of blood, digestion of food, beating of the heart and so on.

Thus the new investigations concerning the human senses open up a most important field in the understanding of those processes upon which life itself, health and vigor depend.—G. B. Lal in *International News Service.*

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NORTH American Indians had only two domesticated animals, the dog and the turkey; the latter used mostly for its feathers.

this sound signal when it bounced back. The sound wave transmitter should, and preferably ought to be, one that sends out super-sonic sounds inaudible to the human ear. No one in the street could hear such sounds except the blind man who, with his tiny apparatus, would have the means to convert the inaudible frequencies into sounds he could hear over his earphone.

With such a device the blind man would have an invisible acoustical "cane" with which he could reach out and touch objects 100 feet and more away.

Dr. Ramo envisions not only such an acoustical "cane" for the blind but believes also that with the aid of some television tricks it ought to be possible to make the blind see scenes in colors.

It would be no great feat to create a spectrum of musical sounds that would correspond to colors, at least the basic primary hues. And it ought to be no difficult task to train a blind person to interpret these musical sounds in terms of the corresponding colors.

Dr. Ramo believes this translation of color into sound would be greatly aided if the blind person had some device which could quickly give him at least the rough conception of the shape or contour of the object he was looking at.

Such a contour indicator might consist of just a simple array of small pegs arranged in a square and connected to a photocell so that all the light portions of the scene would raise corresponding pegs.

All dark portions of the scene would be represented by pegs flush with the board.

For simple objects it is easy to see how the device would work. A white square on a black background would—on the peg board—consist of a square of raised pegs against a flat background. Most anyone could instantly interpret such a configuration merely by the sense of touch.

It would not even be necessary to touch such a peg board with the fingers. It might be worn under the clothing against the skin.

With the aid of acoustics, too, it ought to be possible to work out a better reading machine for the blind that would allow them to read the ordinary printed word. Only 26 different sounds—say musical notes again—would be needed for the whole alphabet.

As such a device passed over a printed line the blind man would hear different musical notes corresponding to the different letters.

As may be realized, in this system the simple and commonly-used words could soon be recognized by the rapid sequence of tones rather than by individual letters.

Books for the blind might have to be printed in large and standardized type by this method—with exact spacing at margins and between lines—but the printing cost would be far less than it is for Braille books which, at present, are the blind's only contact with the written word.

People with normal vision may

think seeing by sound is impossible or at the most extremely complex and difficult but you really do not need the eyes to create pictures in the mind. You merely need to receive some signal in your brain and then train your mind to interpret this signal into the colors or contours or details that go to make up the picture.

People blind in youth, or in adult life, should not have too much difficulty in seeing by sound as here outlined.

It would, however, be virtually impossible for people blind from birth to see scenes in color. They would have no color memories to fall back on.

Discussing ways to replace vision with sound, Dr. Ramo says: "All who have listened seriously to descriptive music are aware of the peculiarly strong ability of music to paint 'pictures.' If music can do that for normal people who sit with open eyes and suffer, therefore, from the confusing action of visual and auditory stimuli at the same time, it is not impossible—indeed it is most probable—that blind persons could build up simple conceptions of pictures from sound alone."

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How Strong is a Clam?

JUST how tightly do clams and oysters "clam up" when they are disturbed? Experiments reported in Science by Prof. A. M. Reese of West Virginia University here indicate that they are able to keep their shells shut against pulls amounting to scores of times their own weight, and to endure these pulls for days.

Prof. Reese was interested particularly in the problem of how a starfish is able to get oysters and clams to open their shells wide enough to let the starfish thrust its stomach into the shell and digest the mollusks right in their own strongholds. He did not solve this problem, but he obtained some highly interesting data on the "shutting-up" strength of the bivalves' shell muscles.

He made small notches in the shells of oysters and clams with a carborundum wheel. Into these notches he inserted small hooks, and applied traction by means of weights on lines passed over pulleys, meanwhile keeping the shellfish alive in a salt solution approximating sea water.

He used weights ranging from about two pounds to more than eight pounds (900 to 4,000 grams), and kept the mollusks under tension for as much as five days on end. Some of them opened their shells slightly, others not at all, even after this long pull. One oyster, after being under a pull of more than three pounds for 48 hours, was suddenly subjected to greatly increased pull, but resisted until the tension went up to 22 pounds, yielding only when its shell-closing muscle was torn apart.—*Science Service.*

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